

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/22579

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F16K 31/12  
US CL : 137/14, 487.5

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 137/14, 487.5, 1,487; 118/685, 692; 251/118/126/61.1,331; 138/40, 42

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 6,539,968 B1 (WHITE et al.) 01 April 2003 (01.04.2003), see entire document.	9, 10, 13 - 15
X	US 6,102,071 A (WALTON et al.) 15 August 2000 (15.08.2000), See Fig. 14.	30 - 32
A	US 5,882,408 A (FUJITA) 16 March 1999 (16.03.1999), see entire document.	1 - 52
A	US 5,985,357 A (SANADA) 16 November 1999 (16.11.1999), see entire document.	1 - 52
A	US 6,173,735 B1 (PERRY, Jr. et al.) 16 January 2001 (16.01.2001), see entire document.	16 - 34
A	US 6,348,098 B1 (McLOUGHLIN et al.) 19 February 2002 (19.02.2002), see entire document.	1 - 52
T	US 6,680,078 B2 (DAVLIN et al.) 20 January 2004 (20.01.2004), see entire document.	1 - 52

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

07 March 2004 (07.03.2004)

Date of mailing of the international search report

23 MAR 2004

Name and mailing address of the ISA/US

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## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐  
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group 1, claim(s) 1 - 15, drawn to a method and apparatus for flow control.

Group 2, claim(s) 16 - 34, drawn to proportional fluid control valve system.

Group 3, claim(s) 35 - 38, drawn to a method of assisting a fluid valve in dispensing.

Group 4, claim(s) 39 - 52, drawn to a device having a set of computer readable instructions pertaining to flow control.

The inventions listed as Groups 1 - 4 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature of Group 1 is the control based on pressure drop associated with a frictional flow element. The special technical feature of Group 2 is the structure of a proportional fluid control valve. The special technical feature of Group 3 is the method of assisting a fluid flow valve in terminating the dispensing of fluid. The special technical feature of Group 4 is set of computer readable instructions pertaining to flow control stored on computer readable memory.